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ABSTRACT

This paper argues that e-learning has not kept pace with the development of increasingly rich IP (Internet Protocol)-based delivery platforms for a number of reasons, including an apparent lack of awareness on the part of developers of the ways in which people learn, and an interest in keeping costs low, which precludes expenditures on effectiveness measures and development of new strategies for delivery. The author also argues that standards such as SCORM (Shareable Courseware Object Reference Model) and IMS (Instructional Management System) do not treat learning outcomes, but instead deal with tagging, coding, and indexing learning objects. This paper asks the question: Under what conditions does e-learning work? Dropout rates for e-learning are much higher (70%) than for standard instruction in four-year colleges (15%). The author contends that there can be no such thing as a generic e-learning model, but that the potential for developing models that are highly suitable for a wide variety of learners and objectives is there. The author uses Gardner's Multiple Intelligences to argue for the need to match technology to learning style. Some of the broad conclusions of Gardner's work indicate that only 30% of adults say they learn best by listening, while another 30% prefer to read and reflect. The paper concludes that the outlook for e-learning is mixed. (Author/NB)

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The Illusion of e-Learning: Why We Are Missing Out On the Promise of Technology

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For League for Innovation in the Community Colleges

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The Illusion of e-Learning: Why We Are Missing Out on the Promise of Technology

Frank L. Greenagel, Ph.D.

E-learning has not kept pace with the development of increasingly rich IP-based delivery platforms because the e-learning experience is far too often puerile, boring, and of unknown or doubtful effectiveness.

- Developers don't seem to be aware of how people learn, for they continue to use mostly flawed models.
- Corporations are more interested in throughput and low unit cost, so solid measures of effectiveness are infrequently developed or applied.
- The available platform drives the instructional strategy, which may not be appropriate to the learning style of trainees or to the learning objectives.
- The cost of development is high, so bad (cheap) programs drive out the good ones in the absence of any commitment to measure effectiveness.
- Effective e-learning experiences for complex competencies are rarely scalable.

Why does the situation persist, when so many knowledgeable people have sat through a course they know to be bad? Habit, and perhaps low expectations by trainees—we don't expect to find the courses stimulating or engaging, so we don't complain too much when they are pretty much like the boring lectures we used to sit through.

A flawed model of cost-effectiveness

At a moment when higher education has become increasingly convinced that the standard classroom lecture is not a particularly effective way of teaching, how ironic that many of those responsible for e-learning say the ultimate goal is to mimic the classroom experience as much as possible. Perhaps that's one indication that e-learning is no longer an unproven cutting-edge experiment, but has moved into the mainstream. A few years ago, only a minuscule percentage of corporate training was technology-based, but in the year 2000, that figure was up to 24 percent and compares impressively to the 57 percent delivered through traditional classroom methods. There are other signs that higher education is looked to for systems of learning management and measurement. The "Carnegie units" model of counting noses (one person in one course for one term) is a standard component of ROI calculations and, while no school system or college would ever mention ROI publicly, they do employ all kinds of ratios to determine "efficiency."

It is difficult not to conclude, however, that there is relatively less emphasis on outcomes measurement in corporate training, certainly in comparison with higher education, where it is intense; my experience over more than 30 years in the corporate world suggests that most businesses give more weight to anecdotal accounts than to efforts to measure outcomes rigorously. Where there is an effort, it seems to be directed toward measuring the cost side of the dyad, especially where training staff can claim substantial cost savings. The trade press is replete with articles quoting training managers boasting of how many hundreds of thousands of dollars (or more) they expect to save with e-learning, generally through less travel,

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fewer hours lost to training, and lower staff costs. Years ago, ROI never came up in discussions of corporate training budgets, primarily because the knowledge/skill level of the workforce was regarded as an intangible asset that did not show up on the balance sheet. That may still be the case, but the telecommunications and systems infra-structure necessary to deliver e-learning *does* appear on the balance sheet, so ROI has become a tool of the trade in training departments. "In tough economic times, you have to demonstrate the ROI of an e-learning project back to the business sponsors," said an HR director at a major firm quoted in *Online Learning*.

Why development of standards is a distraction

In addition to the emphasis on cost savings, there is another dimension that has received considerable attention in e-learning circles--the development of standards such as SCORM (Shareable Courseware Object Reference Model) and IMS (Instructional Management System). These are not standards that treat learning outcomes, but instead deal with tagging, coding, and indexing Learning Objects to facilitate reuse of digitized training materials. Some have likened that effort to "rearranging the deckchairs on the Titanic," but that is perhaps harsher than necessary. The emphasis on adoption of standards is clear: "Implementation of SCORM specifications can help learning technology to become reusable, interoperable, stable, and accessible." Who would be opposed to standards, except there is nothing in any of those standards that focuses attention on the effectiveness of the Learning Objects. Indeed, the term Learning Objects itself ought to cause some unease. An LO (Learning Object) is defined as a "discreet small chunk that can be used alone or dynamically assembled to provide just enough and just-in-time learning. Learning Objects can also enable learners to select the training that is most relevant for them, perhaps even in a media format that matches their preferred learning style (auditory, visual, etc.)." A Learning Object is, thus, a thing that has physical dimensions (type, number of megabytes) that can be measured; it can be tagged and indexed for future use. No one knows, however, whether that LO has ever resulted in anyone learning anything or subsequently demonstrating any competency.

We know that learning doesn't happen in discrete chunks. An acquaintance at the University of Colorado once said, "We have to cross the line between ignorance and insight many times before we truly understand." We get it, then lose it, then kind of get it again, then find out we don't quite have it right, and ultimately, after struggling to master the concept, we have it. Learning often appears a little ragged, and does not generally come in nicely packaged objects, no matter how systematically tagged. Efforts to measure outcomes are difficult enough, but to substitute for those efforts a set of standards which tag and index inputs seems to me to be mistaken.

The lack of emphasis on outcomes

When the e-learning industry attempts to quantify content elements, the concern is misplaced; it diverts attention from the more important issue of measuring effectiveness, *e.g.*, under what conditions does e-learning work? The drive for standards, originating in the mutual efforts of the aviation industry and the Department of Defense, appears to be part of an attempt to make e-learning programs more acceptable to IT departments, who are reluctant to consider anything that involves audio, video, and other features with bandwidth or security issues. The next step, presumably, will be to measure the mean number of megabytes in a

Learning Object, so IT can estimate how much additional capacity they will need to add in order to teach the sales force how to sell the company's new gizmo.

It appears that this push for standards really has little to do with measurable learning outcomes. The move toward standards arose, we are told, because of "complaints about previous generations of e-learning products [which] range from integration issues and interoperability concerns to bandwidth and scalability problems." Those complaints did not, it appears, come from trainees, who often found the training dull, rigid, and not related to their work, but rarely complained about interoperability and integration issues.

In the absence of a sustained emphasis on measurable outcomes, there is little incentive to value anything but "throughput" and low unit cost. But dropout rates (defined as failure to complete a course) for e-learning are much higher (70 percent) than for standard instruction in four-year colleges (about 15 percent). Although three-fourths of corporations use course completion as a measure of effectiveness, some vendors and training executives seek to downplay completion rates as a significant measure of success. Community colleges, on the other hand, pay close attention to course completion rates and consider them a most significant indicator (though not the only one) of their success.

Some concerned voices within the industry have been raised: Eliot Masie, in response to an *InformationWeek* question about the scariest question [regarding e-learning]: "Does it work? If I invite 50 people into a session, is there learning? If it's well-structured, there's the right content, we've taken care of who we invite, and there's a payoff at the end, they'll probably learn as well as [they would] in the classroom—which isn't very well." Still, Masie is among those leading the push for adoption and dissemination of standards, so he apparently sees no inherent contradiction between the centrality of learning effectiveness to the long-range success of e-learning and the drive for interoperability. Indeed, he specifically notes that "all the work on standards and specifications will play a similarly critical role in causing the 'take-off' of the learning industry, [but] they do not, in and of themselves, look after ensuring the quality or effectiveness of learning."

The fact is, e-learning has become well established and will only grow, whether there are standards or not. The cost savings are too great to ignore, regardless of the lack of measurable outcomes, and e-learning has made available to people in remote locations a variety of courses they would not otherwise have had access to; if their motivation was high and their perseverance strong, I have little doubt that many of them learned. So we are not talking about the survival of e-learning. But we may be talking about a degrading of quality if we are content to measure only the cost savings, the compliance with standards and the number of Learning Objects dispensed. Clearly, we should be under no illusions about effectiveness if the failure-to-complete rate remains at 70 percent.

What can be done?

Let's begin with the learning experience. If that is not engaging, only the most highly motivated (or those under duress) are likely to complete the course. How would the typical trainee describe the typical e-learning experience? Boring is the first word that comes to mind, whether the instructional strategy is reading text, watching a streaming video of the average instructor, or following an audio-over-PowerPoint presentation. The developer's attitude seems to be similar to my high school biology teacher's, who often reminded us, "If you're smiling, you're not learning."

Some may call it a masochistic tendency, but I have an irresistible urge to examine e-learning courses whenever I get a chance. Not to complete the course, but to sample it and see how the designer engages my interest, allows me to move through the material, tests my understanding, reinforces appropriate responses and my ability to apply the learning, and corrects my mistakes. I like to see if that designer has made any attempt to adapt to people with different learning styles or perhaps with a different purpose. So I examine the free demonstration courses offered online whenever possible, expecting that purveyors would put their best foot forward and show content that was interesting and well designed. But it is not so. I hope those demos are their throwaway material—dogs they couldn't get anyone to register for—because if they are representative of the rest of their curriculum, a lot of customers are being taken.

At the heart of the problem lie a couple of factors beyond the unwillingness to insist on measurable outcomes: 1) available technology is driving the instructional strategy, 2) developers don't know anything about how people learn, and 3) a desire to produce courses at the lowest unit cost leads to cutting corners and/or to repurposing of material that wasn't very good to begin with. Absent the chance to network with peers, students find e-learning technologies to be very unforgiving. Let's examine the first of those factors.

Technology is not an e-Learning strategy

The need to calculate the ROI for a training initiative should lead to an insistence on definition of an e-learning strategy, which is a very good thing. But the strategic statements I've seen are driven by technology, not by corporate objectives. The infrastructure (largely network bandwidth and telecommunications capability) is the strategy in some of those statements. To me, that's backward. Begin with the organization's objectives, extract the competencies required to attain those objectives, examine the constraints (time, distance, trainee's experience, corporate culture, etc.), and then you can begin to outline the kind of learning experiences that will be necessary to develop those competencies. Only at that point (or when describing the constraints) do you consider the technology and whether its capabilities and limitations are congruent with the learning experiences necessary to achieve the outcome.

Because there is not an established track record for the effectiveness dimension of e-learning, we might examine the extent to which the available programs and the enabling technologies rely on established models of how adults learn. There are two dominant learning models that, consciously or not, are employed in IP-based learning systems: Presentation and Programmed.

Presentation models range from streaming audio and video to PowerPoint programs that have been repurposed and sent over platforms such as PlaceWare. This is the traditional learning model, used for centuries. Sometimes called the "information transmission" model or, more skeptically, "the-sage-on-a-stage," it assumes that most people can learn the content through aural and visual means. At its worst, it is simply a talking head, or a voice over a slide show. Frank Zvi, President of the webcasting vendor Interwise, makes it seem very simple: "If you're an enterprise, human resources can use [streaming audio, video, and data] to have the CEO talk to everyone in [broadcast] mode, and at the same time also talk to specific groups in [seminar] mode."

At best, the speaker may be excellent and the graphics, video clips, and other visual aids add materially to the listener's understanding. Presentation models have been one-way until recently, when live, interactive videoconferencing has become available, if somewhat unreliable. Still, there are doubts.

We teachers—perhaps all human beings—are in the grip of an astonishing delusion. We think that we can take a picture, a structure, a working model of something constructed in our minds out of long experience and familiarity, and by turning that model into a string of words, transplant it whole into the mind of someone else. Perhaps once in a thousand times, when the explanation is extraordinarily good, and the listener extraordinarily experienced and skillful at turning wordstrings into nonverbal reality . . . the process may work, and some real meaning may be communicated. Most of the time, explaining does not increase understanding, and may even lessen it.

The other dominant model, **programmed instruction/tutorials** is particularly popular for asynchronous learning. Now frequently referred to as "traditional (!) CBT," most of the courses available on the Internet are based on this model. The developer essentially chops the content into manageable chunks of text (perhaps augmented by audio/video clips and graphics), and lets the trainee work through the screens at her own pace. There are frequent questions interspersed with the instruction, and immediate feedback. Some programs offer remediation for wrong answers, but most simply ask the trainee to try the question again. Tutorials can be individualized (by means of a pretest or self-inventory) but few offer contingent tracks based on the trainee's profile. Many of the capabilities are entirely consistent with basic learning theory, but the content is mostly text and is frequently criticized as boring and puerile. The IP-based platforms did not (until very recently) build in opportunities to interact with other learners or to ask questions of the instructor. One feature of this model is that the instruction was often built around quantifiable learning objectives, which were usually measured in some kind of post-test. That doesn't meet Kirkpatrick's Level Four criterion, but it's more than most presentation models build in.

There are other instructional models that have occasionally been used with IP technologies, including what might be called the apprenticeship/coaching model. Combined with **case studies, projects,** or **simulations**, there is exceptional potential for learning complex competencies. Unfortunately, they are rarely employed, presumably because of the development cost and the fact that case studies and projects are not particularly scalable. An excellent example of the use of the project model is Unext.com's Cardean University course on Promotion and Principles of Marketing. Each unit is structured around a project, which the trainee has to complete (*e.g.*, preparation of a brand marketing plan), and offers readings, data, competitive information, etc.; it encourages interaction by means of e-mail with other students and includes video/audio clips and rapid feedback from the course's instructor. [A demonstration course is available at www.cardean.edu.]

From my own experience, the case study/simulation model can offer an exceptionally rich learning experience. Working with a network security firm whose objective was to teach network field engineers how to configure a security system, my company designed a series of increasingly complex networks, represented by detailed network architecture diagrams, which trainees would have to protect from a variety of viruses, Trojan horses, denial of service (DoS) attacks, and other hacks by means of firewalls, VPNs, Intrusion Detection Systems, honeypots, and DMZs, appropriately placed and configured. Trainees have access to explanations of what the various

security devices are, how they work and how to configure them for several levels of protection appropriate to different kinds of clients. Trainees were asked to design a security system for a client by inserting symbols into the network architecture diagram and identifying key configuration items. If they get it right, the DoS is foiled, viruses are kept out, and no data is compromised. If they get it wrong, they can "watch" hackers get in and destroy data or use the site to launch DoS attacks on other sites. Trainees were provided with a text-based briefing of the vulnerability/nature of the hack, IDS records of the sequence, and operations involved in the hack, and given another chance to reconfigure the security system.

There are also **hybrid models** in use in higher education and corporate training that combine e-learning with classroom or lab sessions; my experience suggests these can be particularly productive, assuming the learning model for each part has been carefully thought through. There is no advantage to a hybrid delivery system, however, if both e-learning and classroom use a lecture/presentation strategy. Community colleges have employed IP technologies to make the lecture and lab sessions more intense and better focused by assuring that students are well prepared for them, then using e-mail and chat to respond to questions and reinforce the experience. Toshiba's Telecommunications division was using this model six years ago to cut the lab time on digital key telephone systems by half while increasing every measure of competency, including helpdesk calls and time to install.

Why we're missing the real potential of IP technologies

Obviously, there can be no such thing as a generic e-learning model because the range of potential instructional strategies and learning models is significantly, but not entirely, dependent on the capabilities of the delivery platform. Vendors with a repository of content that has been repurposed for the Internet favor the Programmed instruction model; vendors with a rich media/streaming video platform favor the presentation (sage-on-a-stage) model. Those with collaborative tools haven't done much yet, so no convention has emerged (in what little I've seen). Most common are the electronic page-turners that are often PowerPoint programs or texts reformatted into HTML; they don't give any evidence that the developer has thought much about how people learn. How else could one create 400 courses overnight, as some firms claim? The delivery media drives the learning model, not the other way around.

Given the rich videoconferencing-plus-collaboration platforms that are emerging (Polycom, Tandberg), we still have a chance to show how the Internet can enhance the learning experience and not merely extend traditional models to wider audiences. There is the potential now to develop models that are highly suitable for a wide variety of learners and objectives, so let us examine what is known about how adults learn.

Matching technology to adult learning styles

Let's consider the broad conclusions about adult learning that have emerged in recent years. Earlier generalizations that informed much of the best practices of CBT remain largely valid (self-paced, individualized tracks, frequent practice, immediate reinforcement, emphasis on outcomes), but Howard Gardner's work, *Multiple Intelligences*, stimulated a lot of rethinking and research into learning styles. Among the most suggestive conclusions to emerge from that work are these:

- People have different learning styles. Only 30 percent of adults say they learn best by listening; another 30 percent report they'd prefer to learn by reading and reflection.

- The subjective difficulty of the material (i.e., for that trainee) affects the learning style, as does gender (sometimes) and perhaps (ethnic) culture in certain areas.

- On complex topics/judgment issues, people need to get comfortable, to mess around with the topic before they can understand it; understanding does not necessarily flow in a linear manner from breaking the task/object into simpler component parts.

- Learning is often a gradual process that happens through a series of shaping activities, which are not always instructor initiated. This is sometimes called tacit learning. The coaching process recognizes this, and so do many lab courses where we expect student skills will develop over the semester without explicit focus on those skills.

- Learning communities work; there is a social as well as cognitive dimension to learning. Students transform the information they get from instructors and texts into meaningful knowledge through conversations, arguments, lunches, discussion groups, and other real-world activities. "Bull sessions actually do have a lot of value."

Capabilities of IP-based platforms

Now let's consider the capabilities of the current and developing IP-based platforms:

Sharing & collaboration, messaging & chat systems, such as Groove and eRoom, hold exceptional promise for individual/group tutoring, as well as for building learning communities. They have low bandwidth and processing requirements, but high potential for many learning tasks, both synchronous and asynchronous. This capability enables tutorial and presentation models, of course, but may be particularly suited to those built around case studies and projects.

Presentation systems: Streaming audio & video (live and canned), including WebEx and HorizonLive, bring multimedia to multiple points at low cost. There are relatively modest bandwidth/processing requirements compared to conferencing systems, but the communications are essentially one-way, so, in the absence of other capabilities, this technology is locked into a presentation model. It is widely used for both synchronous and asynchronous presentations.

Conferencing systems: Live, real-time audio & video conferencing, like Polycom and Tandberg, offers an enriched classroom experience, plus the power of collaborative tools. High bandwidth/processing requirements and other issues related to security means this technology is not for the casual user. The systems are not yet robust enough to move into the mainstream, but close. There is a significant cost savings over ISDN-based systems, as well as considerable improvement compared to the uneven quality of that older technology. Conferencing systems offer potential for using a variety of learning models, but they are largely intended for synchronous learning. An e-learning strategy with access to this capability might choose to offer a significant amount of instruction by means of other IP-based technologies, then periodically use multipoint video-conferencing to, say, review a case or project,

asking the team to defend it in the face of questions from other trainees or the instructor. But I fear that once a robust IP-based conferencing system is in place, the tendency will be to emphasize the sage-on-a-stage learning model because it will be cheaper and faster to develop.

With those capabilities, developers have the ability to create more effective learning experiences by creating communities of online learners who can share experiences, questions, and tentative solutions and generally noodle with a task until they've solved it. They can question the instructor, instead of just listen to him. Technology can offer alternative and complementary ways of approaching a topic: read, listen, observe, discuss, reflect, construct. Simulations may be inexpensively done, supplemented by Instant Messaging and e-mail among the trainees.

Do we need to use all the capabilities of e-learning technology for every training task in the curriculum? No. Some cognitive skills can be learned with a minimal Internet platform, although pace, practice, feedback, and remediation are probably necessary if you are to reach an 80-80 standard (80 percent of trainees score 80 percent or better on the post-test). The effectiveness of the course is less dependent upon the enabling technology than on the skill with which the developer uses the available technology to construct learning experiences appropriate to the trainee and to the topic. But many firms are likely to be reluctant to embrace one platform for one set of tasks and a different one for other instruction, so the availability of a delivery platform is likely to continue to drive the learning model unless management is unusually sophisticated.

Conclusion

Increasingly rich delivery platforms are available, at a fraction of the cost of just a few years ago, but a trainee's e-learning experiences are mired in a technology that's not much advanced from the teaching machines of the early 1960s. Developers don't seem to be aware of how people learn, or if they are, they nevertheless continue to use mostly flawed models of adult learning. For those vendors, that business model may be cost-effective in the short term. Corporations are giddy about the savings the P&L statement is showing, but the hangover will come when they realize that costs have been saved at the expense of competencies.

The technology platform is driving the instructional strategy, warping our focus, which should be on creating an engaging learning experience that reliably contributes to the organization's objectives. We are going to have to accept the fact that the cost of development of good e-learning courses is high (should that really come as a surprise to anyone?), and that the effectiveness of those courses has to be measured as carefully as one measures cost savings. Only then can e-learning realize its potential.

What is the outlook?

Mixed. For many learning tasks that are not too complex (and especially if motivation is high), they will be accomplished via e-learning for many trainees at least as well, cheaper, and with more people getting more training in a convenient manner than before. For that, we should be grateful.

For more complex skills, such as designing and configuring a network security system, we'll have the illusion of learning because we have our headcounts, class hours, and certificates awarded, but competencies on the job will be marginal until

experience will gradually bring up the more highly motivated people to a level that could have been achieved with the application of better learning models. Dropout rates for e-learning will continue to be considerably higher than those for traditional instruction. Educational technology has long been seen as promising, but has rarely lived up to the promises. Not because it wasn't effective, but because it was cumbersome, boring, and did not adapt to the way people wanted to learn. The e-learning industry is in danger of repeating that cycle.

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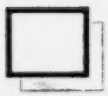

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